

2. On the Diseases of Monkeys in the Society's Gardens.

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When "a generally received opinion" is made the subject of careful investigation, it not unfrequently turns out to be erroneous. So with regard to the diseases of Monkeys living in this country. The general public hold the belief endorsed by the medical profession, that nearly all the Monkeys brought to England die from tuberculosis. After careful examination I fail to find any reasonable excuse for so widely spread an error.

In 1845 Dr. Percy, in a paper published in this Society's 'Proceedings' gave an account of his "Management of Monkeys in Confinement." At the end of the article he mentioned some diseases to which these animals are liable; in one only did he find *phthisis pulmonalis*, and that was in a Rhesus (*Macacus rhesus*), bought from an itinerant showman. Dr. Crisp reported upon sixty-seven inspections of the *Quadrumana*, with three cases only of tubercle. In 1881 the Pathological Society of London, on the proposal of Mr. Hutchinson, appointed a Committee to report on the present state of our knowledge of the diseases of the lower animals, and on the best means for its advancement, and especially to make use of the material available at the Society's Gardens, which, through the kindness and influence of Professor Flower, had been placed at its disposal by this Society¹. Since that date, as one of their Committee, I have had excellent opportunities of investigating Comparative Pathology in all varieties of animals dying in the Society's Gardens, whereby much new matter has come to light. As the *Quadrumana* are so near to man, they have naturally attracted a considerable share of my attention.

From Dec. 1, 1881, to March 30, 1883, an interval of sixteen months, one hundred and ten *Quadrumana* of various species died. Of this number I examined the viscera of ninety-three.

1. *Tubercle*. This caused death in three instances only. Two were Rhesus Monkeys, and the third a Vervet Monkey, all Old-World species. The disease was unmistakable, tubercular phthisis associated with cavities in the apices of the lungs, in every point resembling the disease as met with in the human subject.

2. *Bronchitis*. A very slight attack of this affection appears to be rapidly fatal. It was met with in twenty-two cases, sometimes associated with emphysema, generally vesicular, but occasionally of the interlobular variety.

3. *Pneumonia* in its lobar form is not so common; three deaths alone could be satisfactorily traced to this cause. The lobular form is frequent, seven deaths having been occasioned by it. Three of the

¹ *Vide* Path. Soc. Trans. 1882, "Report of Council."

cases were amongst the Lemurs, associated in one with cystitis. The prevalence of lobular pneumonia results from the frequency of bronchitis and rickets.

4. *Empyema*. Two cases.

5. *Abscess* of lung burst into a bronchus filled the trachea, and thus suffocated a Baboon.

6. *Œdema* of lung killed a Squirrel-Monkey.

7. A not uncommon mode of death in young animals is *alveolar abscess* leading to ulceration and sloughing of the gums, the purulent discharges are swallowed, some getting inspired (possibly during sleep) and septic pneumonia established, sometimes leading to gangrene of the lung. This proved fatal in a young Chimpanzee.

8. *Scrofula* was well marked in three cases—a Baboon with caseating glands in the neck, a Capuchin with suppurating glands in the axilla, and lastly a Rhesus Monkey with a caseating mass in the dorsal region of the thorax associated with spinal caries, paraplegia, and meningitis, which gradually extended to the cranium and caused death.

9. *Intussusception* of the jejunum killed a very fine Lemur. I find that cases of intussusception occur among animals after a sudden chill. Garrod noticed this fact with regard to a Kangaroo, an Emu, and a Paradoxure, and reported the same in the Society's 'Proceedings' 1873. He says:—"During the first week of this month (February) the cold weather coming on suddenly seems to have caused the death of three animals in the Gardens, in all of which on post-mortem examination it was found that the lesion was the result of excessive and abnormal movement in the abdominal viscera."

The telescoped condition of the small intestines is very common among animals, and probably occurs during the agony: this is easily distinguished from true invagination of the bowel. Whether a sudden chill may cause an invagination of intestine in man is a subject for inquiry.

10. *Leucocythemia* was met with in a Lemur, the spleen of the animal having become enlarged to fifty times its normal bulk. The proportion of leucocytes in the blood was one to eighty red corpuscles. This is interesting, inasmuch as these creatures come from Madagascar, an island famous for ague. Lemurs are very liable to cataract. The reason why is not very obvious. One Lemur died from purulent pericarditis due to perforation of the pericardium by a caseating lymphatic gland.

11. *Typhoid fever* proved fatal in four cases, three Lemurs and one Monkey. Two of the Lemurs lived in the same cage. The animal first affected suffered from profuse diarrhœa, and at the autopsy perforation of the ileum was found, all the ulcers being confined to the neighbourhood of the ileo-cæcal valve. The second died seven days after its companion, from severe hæmorrhage; ulceration of the agminate and solitary glands had taken place from the commencement of the ileum to within half an inch of the anus. It is very probable that the second Lemur contracted the disease by direct inoculation from its mate for the following reasons:—

(a) The animal which died first was the one first observed to be ill.

(b) The fæcal discharges were so profuse that the keeper had difficulty in keeping the cage clean.

(c) The companion Lemur jumping about the cage, not merely contaminated her own body but occasionally dropped her food into the fæces, thus taking the morbid material directly into the alimentary canal in contact with the Peyerian glands.

(d) The unusual length of intestine found ulcerated also lends support to the notion of direct contagion.

The fact that the mucous membrane of the rectum was ulcerated is a point of some interest. In conducting post-mortem examinations, on human subjects dying of typhoid fever, it rarely happens that the rectum is examined. Profiting by the experience gained in examining these Monkeys I have in all cases of typhoid fever, where the opportunity has occurred, examined the condition of the mucous membrane at the lower end of the alimentary canal, and have found in some cases a ring of infiltration and ulceration about half an inch above the anus. The explanation is not far to seek. If the rectum be split longitudinally it will be seen that half an inch above the anus there is an abrupt change in the mucous membrane, the squamous epithelium of the anus being suddenly replaced by the columnar variety, beneath which is a substratum of lymphoid and glandular tissue. It is this ring of tissue which in typhoid fever undergoes infiltration, ulceration, &c., as does a Peyer's patch or solitary follicle in the ileum.

Rickets. A very unexpected cause of death manifested itself in bone disease, in the form of typical rickets. Next to bronchitis this is the most frequent cause of death among the Monkeys. During the past summer I have been able to observe the animals suffering from this disease, and can give a fairly complete clinical history of the affection.

When a Monkey becomes affected with rickets he is less active than usual, and instead of leaping about from place to place, sits on the floor. Gradually paralysis of the lower limbs comes on; the creature now moves about by using his long arms as crutches. The bones soften, and those of the upper limb, having to support the weight of the body in progression, begin to bend. The paralysis of the lower limbs increases, and the creature becoming completely paraplegic, loses control over the sphincters and suffers from incontinence of urine and fæces, and occasionally from priapism. The ribs and sternum share in the general softening, allow the thoracic parietes to yield to atmospheric pressure, causing embarrassment of respiration; the animal gets an attack of bronchitis, and soon dies. Such a case as this is a severe one, but I have watched a Monkey apparently in good health die horribly deformed with rickets in four months. It is highly probable that many less severe cases have been overlooked, so that at present it is impossible to state with any degree of accuracy the relative frequency of death from this cause, but it is a very prevalent disease. Its chief symptoms may be

briefly enumerated as deformity, pain, paraplegia, incontinence of urine and fæces. Dr. Percy, in the paper before alluded to, states that some of his Monkeys died from mollities ossium, the symptoms being deformity and paralysis.

The condition of the skeleton in such cases is very remarkable. The bones are enlarged, and so soft that they can be cut with a knife as easily as a potato; in severe cases not a bone escapes, not even the hyoid; indeed they exhibit in an extreme degree the pathological condition met with in rickets as it occurs in young children. I find the disease has two opposite effects on the skull. In most Monkeys the bones of the cranium soften and in parts undergo thinning; sometimes they atrophy so as to give rise to actual perforation of the skull: this condition is most frequently observed in the cerebellar fossæ and roof of the orbit; now and then it is seen on the roof of the skull. In other Monkeys, chiefly the Baboons, the skull-bones thicken. In some cases I have observed the roof of the skull to be as much as half an inch in thickness. A complete account of the pathology and microscopic appearances of the various parts of the skeleton in these cases will be found in the Transactions of the Pathological Society, volume xxxiv.

There yet remains the paralysis to be accounted for; this symptom perplexed me extremely, but I am now able to give a satisfactory explanation of it.

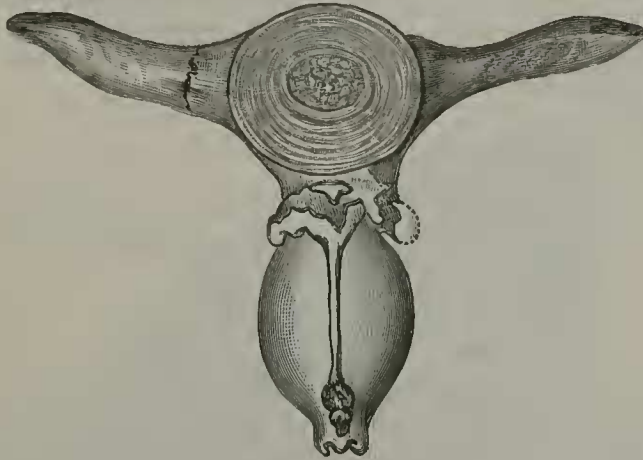
The 'Journal de Zoologie' for 1875 (iv. p. 272) contains an interesting article by Paul Gervais, entitled "De l'hyperostose chez l'homme et les animaux." Among the specimens there figured is a vertebra from an animal named *Pachyacanthus* dug up near Vienna. It is a very singular specimen, and shows a condition which is very rarely met with, viz. gradual general obliteration of the spinal canal due to overgrowth of bone. This supplied the hint, and I divided the spinal column in all rickety Monkeys. This is what I found:—The general overgrowth and softening of bone so common throughout the skeleton had not spared the vertebræ with its various processes, but they had enlarged and encroached upon the spinal canal and thus exercised general slow compression upon the spinal cord. When the creature stands, the pressure of the superincumbent weight would cause the vertebral bodies to bulge and compress still more the spinal cord and nerves as they emerge from the various intervertebral foramina, hence the pain when the creature is raised; the continuous irritation of the lumbar spinal cord will also explain the incontinence and priapism. I am not aware of any recorded cases of such general narrowing of the neural canal; and it is easy to explain why it has been overlooked, for it is usual to expose the cord by removal of the vertebral arches, thus destroying the relative size of the cord to the spinal canal; whereas if a transverse section of the column be made with the cord *in situ*, the change is obvious. The cord and nerves when examined microscopically exhibit all the changes found in the grey and white matter when the cord has been compressed from other causes, such as cancer, tumour, vertebral caries, &c. It is very probable that the agonizing pains which form

so marked a feature in mollities ossium in human beings may result from a similar condition of the spinal column.

The principal cause of rickets in Monkeys is the fact that many of them are captured when quite young, and in lieu of the breast-milk of the mother are fed on fruits, rice, and cows' milk.

It may be mentioned here that the Royal College of Surgeons possesses a Hunterian preparation of a rickety Monkey.

Fig. 1.



Vertebra of *Pachyacanthus*, showing the narrow spinal canal (after Gervais, *l.c.*).

Fig. 2.



Transverse section of the vertebral column with the cord *in situ*, to show the mode in which the cord gets compressed by overgrowth of the surrounding bone. From a Monkey.

The Milk-white Patch. In conducting human post-mortems it is very usual to find on the anterior surface of the heart a thickening of the visceral layer of the pericardium, technically known as the "milk-white patch," concerning the causation of which pathologists have held two opposite notions. One opinion is that the thickened area is the result of chronic inflammation. The other and more probable view holds that it is due to pressure: this is called the "attrition" theory.

This milk-white patch is often met with in Monkeys, but on various parts of the heart, sometimes on the auricles, at others on the ventricles; but it is always due to pressure either from an enlarged gland, deformation of the thorax, pressure of an abscess, or some such cause. But the most convincing case occurred in a young Rhea, which was affected with rickets, so that the ribs yielded and allowed the heart to be compressed between the broad sternum and the vertebral column. In this case the anterior surfaces of the ventricles and the right auricle were covered with a large milk-white patch due to the pressure of the sternum.

In conclusion I would remark that in merely recording the diseases of wild animals in confinement little is to be gained, but in elucidating the diseases of man Comparative Pathology will act as a side light of no mean power.

3. On the Habits of *Thomisus decipiens*, a Spider from Sumatra. By H. O. FORBES, F.Z.S.

[Received November 20, 1883.]

(Plate LI.)

Having sent the specimen now exhibited to Mr. O. P. Cambridge for determination, he writes me:—"I believe it to be undescribed. Mr. Blackwall has described a tolerably near ally from the E. Indies, *Thomisus tuberosus*, Bl., and Karsch has described several which appear to belong to the same group from other quarters; but I do not think yours is the same species as either, even if of the same group, which, as Karsch gives no figures, is not certain. I have close allies from E. Indies and Ceylon, and also from S. Africa, none of which have as yet been described. The S.-African species is almost exactly similar in its colouring and manner of sitting, so as exactly to resemble the droppings of birds; this was specially noted to me by the friend who sent the specimens to me, and I have just shortly noted it as an instance of protective resemblance in 'Spiders of Dorset,' vol. i. p. xxix of Introduction. * * *. This group ought to form a genus separate from *Thomisus*, but you might describe yours provisionally as a *Thomisus*." I therefore propose to give this interesting specimen the surname of *Thomisus decipiens*, in order to identify it with the account of its habits which I am now about to give.

On June 25, 1881, in the forest near the village of Lampar, on the banks of the Moesi river in Sumatra, while my "boys" were procuring for me some botanical specimens from a high tree, I was rather dreamily looking on the shrubs before me, when I became conscious of my eyes resting on a bird-excreta-marked leaf. How strange, I thought, it is, that I have never got another specimen of that curious Spider I found in Java which simulated a patch just like this! I